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DOES ANATOMY EDUCATION TRANSLATE TO CLINICAL COMPETENCE? A STUDY OF MEDICAL INTERNS

Mithilesh Chaurasiya
Senior Lecturer, Department of Anatomy
Asia International University, Bukhara, Uzbekistan
Email: themithlesh@gmail.com

Abstract:

Background: Anatomy forms the cornerstone of medical education, yet its practical translation into clinical skills remains debated, especially with the ongoing shift toward competency-based curricula. **Objective:** This study assessed the perceived clinical application of anatomical knowledge among interns at National Medical College, Nepal. **Methods:** A descriptive cross-sectional study was conducted among interns who had completed at least six months of clinical postings in Medicine, Surgery, or Obstetrics & Gynecology. **Results:** Among the participants (mean age 24.14±0.96 years), Surgery (27.7%) and Medicine (35.1%) were the top career choices. Surface anatomy (79.8%) and dissection (76.6%) were deemed highly useful during preclinical training. Systemically, respiratory (77.7%), genitourinary (75.5%), and cardiovascular (72.3%) anatomy were most clinically relevant. Interns strongly agreed on anatomy's utility during Surgery (89.4%) and Medicine (74.5%) postings. Key clinical applications included imaging interpretation, organ localization, trauma management, obstetrical delivery, and minor surgical procedures. **Conclusion:** Anatomical knowledge is indispensable for clinical competence. Integrating clinical correlates throughout the undergraduate curriculum is crucial to bridge the gap between theoretical knowledge and bedside practice.

Keywords: Anatomy education, Clinical competence, Medical interns, Translational anatomy, Nepal, Medical curriculum.

Introduction:

Human anatomy, which deals with the structure of the human body, remains a fundamental pillar of medical education. However, the ongoing transition from traditional teaching methodologies to competency-based curricula has created a noticeable gap between theoretical knowledge and its practical application. This disconnect often results in poor spatial awareness, underdeveloped clinical judgement, and an inability to proficiently navigate real-world patient care challenges [**1**].

The internship period serves as the culminating phase of medical training, where students are expected to apply the anatomical principles learned during their first year and integrated vertically across clinical subjects. In routine ward postings - such as Surgery, Medicine, and Obstetrics & Gynecology - interns frequently perform bedside procedures and emergency interventions that demand a solid foundational knowledge of human anatomy [**2**]. Consequently, contemporary anatomy education must evolve to prioritize clinically relevant subsets, particularly gross anatomy and radiological imaging. Prior research has consistently indicated that insufficient integration of basic sciences within conventional curricula contributes to the preparation of underconfident interns, despite preclinical disciplines being essential for developing clinical reasoning skills [**3**].

Furthermore, a thorough understanding of cross-sectional anatomy at clinically significant levels is indispensable for interpreting computed tomography (CT), magnetic resonance (MR), and

ultrasound (US) images. Similarly, surface and functional anatomy are critical for conducting precise physical examinations and executing emergency procedures [**4**]. The practical reconstruction of the human body in clinical settings depends entirely on the effective application of anatomical knowledge [**5**], and the concept of "anatomy competence" has been formally defined as the possession of appropriate factual knowledge alongside its skilled clinical deployment [**6**].

This study, conducted among interns at National Medical College, Nepal, aims to evaluate the clinical utility of anatomy within the current medical curriculum and to explore its relevance in clinical decision-making across both surgical and non-surgical specialties. Gathering feedback from both students and educators through such curriculum evaluation is a crucial and logical step in the continuous teaching-learning process [**7**].

Materials and Methods:

This descriptive, observational study employed a cross-sectional design conducted among interns at National Medical College, Nepal, who had completed at least six months of clinical postings in Medicine, Surgery, or Obstetrics & Gynecology. After obtaining informed consent, a pretested, predesigned questionnaire was administered over a three-month period. Confidentiality and anonymity of the participants were ensured. The collected data were cleaned, collated, and analyzed using IBM SPSS version 20.

Ethical Approval:

Ethical approval was received from the Institutional Ethical Committee of National Medical College, Nepal.

Results:

A total of 94 interns (mean age 24.14±0.96 years; 59.6% males, 40.4% females) participated, with 88.3% having chosen medicine voluntarily. Regarding career preferences, General Medicine (35.1%) and Surgery (27.7%) were the top choices for higher studies, while Microbiology (19.1%) and Community Medicine (17%) were least preferred (figure 1).

Anatomical knowledge was considered highly useful during surgical and gynecological postings (89.4%), but perceived as less relevant in Psychiatry (33%) and Community Medicine (21.2%) rotations. Among specific competencies, surface anatomy (79.8%) and mannequin-based learning (78.7%) were rated as most necessary. Notably, 31.9% remained neutral regarding the need for refresher courses, while minor disagreement (≈10.6% each) was noted regarding the utility of gross anatomy, radiology, early clinical exposure, and gastrointestinal anatomy in clinical practice.

Clinically, anatomy knowledge was most required for imaging and diagnostic aids (74.5%) and arriving at a diagnosis (72.3%). Core anatomical competencies - including gross anatomy, surgical steps, and catheterization - were regarded as indispensable during various ward postings, highlighting the direct translational value of anatomy education in bedside patient care.

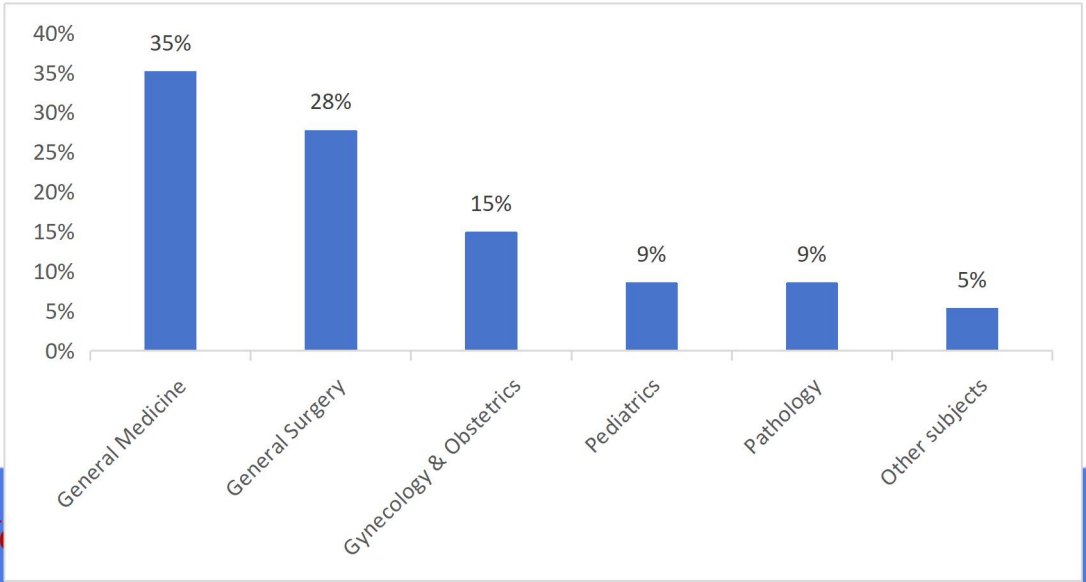


Fig 1: Bar diagram showing preference for higher studies among interns

Discussion:

The integration of anatomy with clinical disciplines like radiology, pathology, and surgery, alongside evolving diagnostic tools such as CT and MRI, reinforces its clinical relevance and demands specific anatomical expertise [**8**]. Given the dynamic nature of medical education, anatomical competencies require periodic redefinition [**9**,**10**], alongside knowledge of newer diagnostic techniques [**10**]. While clinicians remain equivocal about anatomy's role in clinical effectiveness [**11**,**12**], dissection remains indispensable for later clinical practice. Studies advocate for early clinical exposure through ward visits over didactic lectures [**13**], with a majority supporting integration prior to surgical internships [**14**]. Anatomy is vital for emergency procedures, imaging interpretation, and physical examinations [**14**], emphasizing that clinical significance should supersede mere morphological details in early undergraduate years [**15**].

Problem-based learning and early integration of basic with clinical sciences are recommended to bridge the preclinical-clinical gap [**16**,**17**]. Contrasting with previous findings that highlighted circulatory and locomotor retention [**18**], our study identified genitourinary anatomy as most clinically needed. Surgery remained a top career preference among participants, consistent with existing literature [**19**]. Ultimately, repeated clinical application reinforces knowledge retention [**20**,**21**], and early clinical years should primarily assess the ability to apply anatomical knowledge to diagnostic reasoning and clinical problem-solving [**22**,**23**].

Conclusions:

Anatomy education directly translates to clinical competence, as evidenced by its utility during surgical and medical postings among interns at National Medical College, Nepal. Anatomical knowledge is critical for imaging interpretation, diagnostic reasoning, and bedside procedures. Bridging the preclinical-clinical gap through integrated teaching is essential for effective translation of anatomical knowledge into routine practice.

Recommendation:

A fully integrated undergraduate anatomy curriculum with clinical applications should be implemented alongside strengthened early clinical exposure, refresher courses, and vertical integration during postings to enhance knowledge retention and application. Medical educators should adopt innovative strategies such as problem-based learning, radiological correlation, and simulation-based training to make anatomy more clinically relevant and competency-focused for students.

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